Device Modeling Report

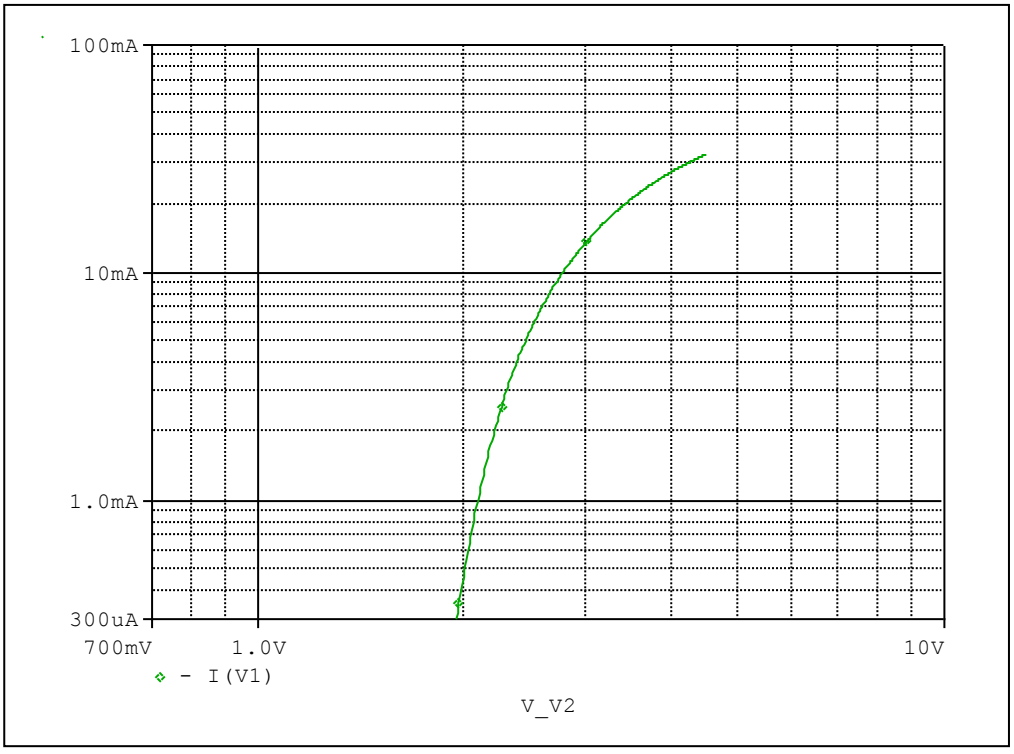
COMPONENTS: BRT
PART NUMBER: RN1117FV
MANUFACTURER: TOSHIBA

Bee Technologies Inc.

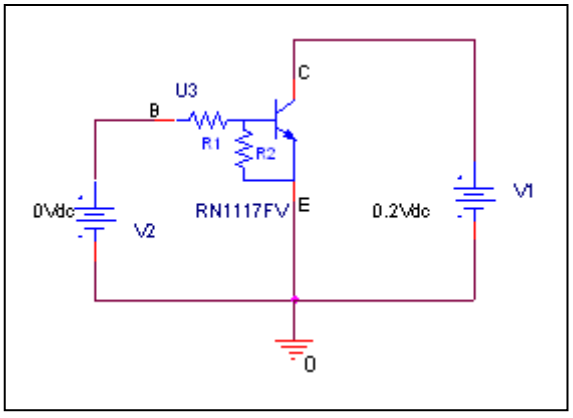
PSpice model parameter	Model description
IS	Saturation Current
BF	Ideal Maximum Forward Beta
NF	Forward Current Emission Coefficient
VAF	Forward Early Voltage
IKF	Forward Beta Roll-off Knee Current
ISE	Non-ideal Base-Emitter Diode Saturation Current
NE	Non-ideal Base-Emitter Diode Emission Coefficient
BR	Ideal Maximum Reverse Beta
NR	Reverse Emission Coefficient
VAR	Reverse Early Voltage
IKR	Reverse Beta Roll-off Knee Current
ISC	Non-ideal Base-Collector Diode Saturation Current
NC	Non-ideal Base-Collector Diode Emission Coefficient
NK	Forward Beta Roll-off Slope Exponent
RE	Emitter Resistance
RB	Base Resistance
RC	Series Collector Resistance
CJE	Zero-bias Emitter-Base Junction Capacitance
VJE	Emitter-Base Junction Potential
MJE	Emitter-Base Junction Grading Coefficient
CJC	Zero-bias Collector-Base Junction Capacitance
VJC	Collector-base Junction Potential
MJC	Collector-base Junction Grading Coefficient
FC	Coefficient for Onset of Forward-bias Depletion Capacitance
TF	Forward Transit Time
XTF	Coefficient for TF Dependency on Vce
VTF	Voltage for TF Dependency on Vce
ITF	Current for TF Dependency on Ic
PTF	Excess Phase at f=1/2pi*TF
TR	Reverse Transit Time
EG	Activation Energy
XTB	Forward Beta Temperature Coefficient
XTI	Temperature Coefficient for IS

Input voltage vs. output current (ON characteristics)

Circuit simulation result

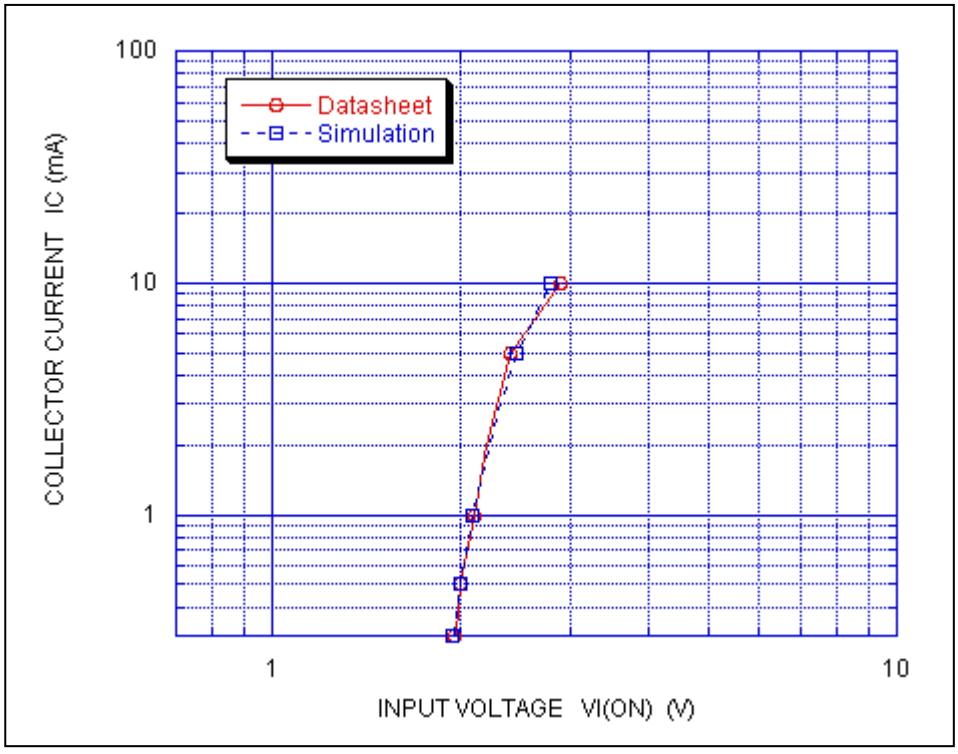


Evaluation circuit



Comparison Graph

Circuit Simulation Result



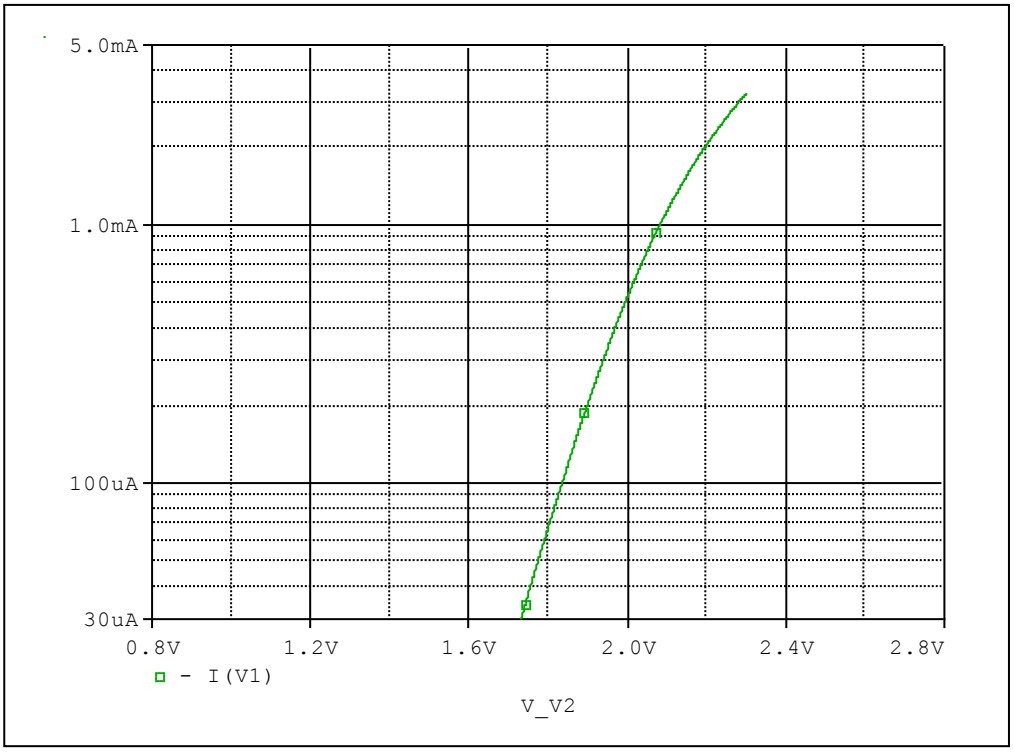
Simulation Result

Condition @ Vce = 0.2 V

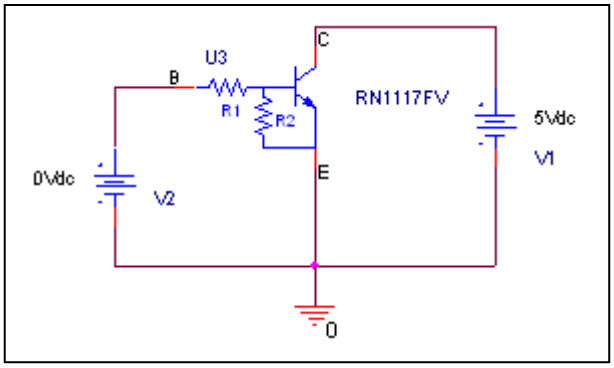
Ic(mA)	$V_{I(ON)}$ (V)		Error (%)
	Datasheet	Simulation	
0.3	1.95	1.9437	-0.32308
0.5	2	2.0011	0.05500
1	2.1	2.0901	-0.47143
2	2.2	2.2089	0.40455
5	2.4	2.4517	2.15417
10	2.9	2.7826	-4.04828

Output current vs. input voltage (OFF characteristics)

Circuit simulation result

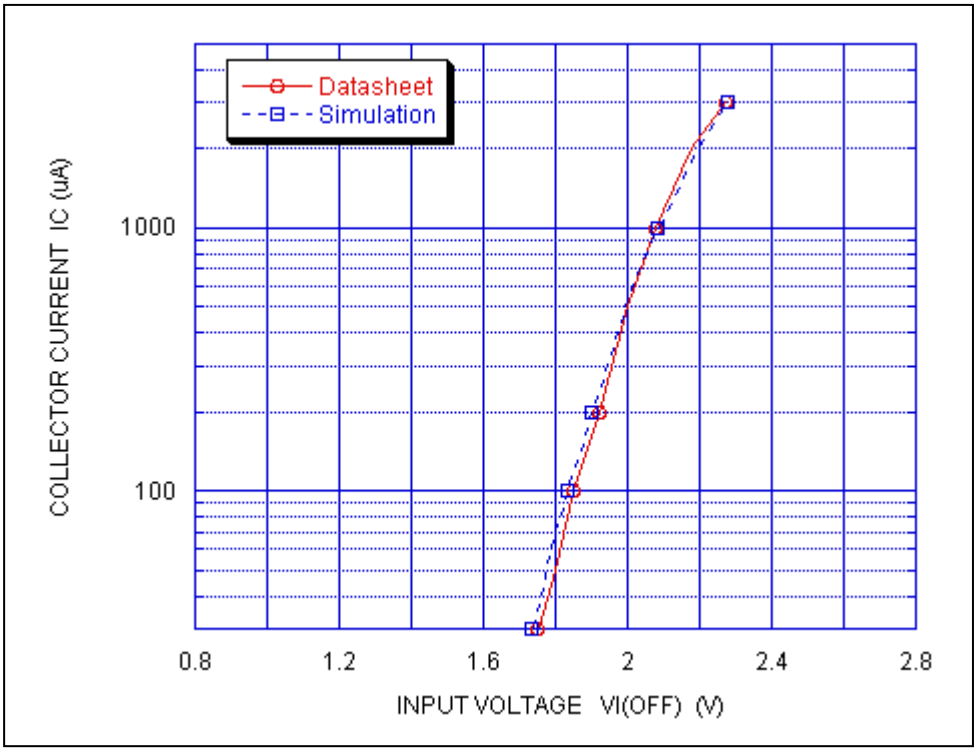


Evaluation circuit



Comparison Graph

Circuit Simulation Result



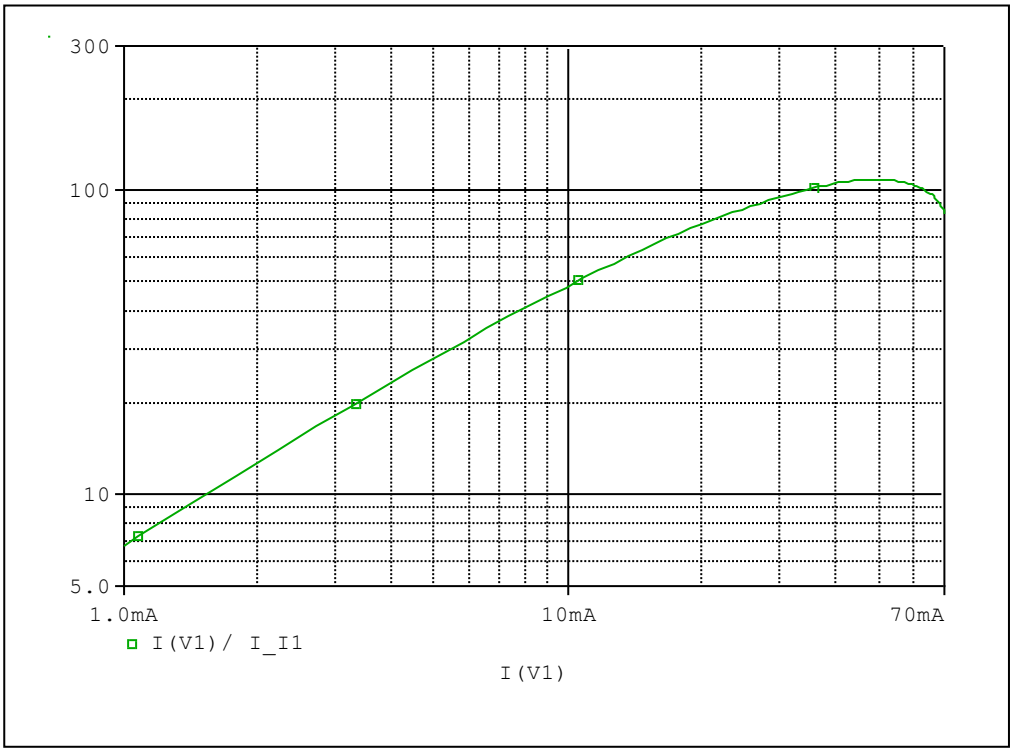
Simulation Result

Condition @ Vce = 5 V

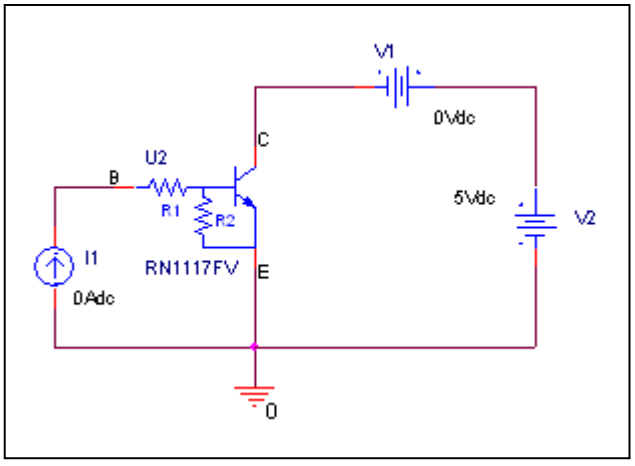
Ic(uA)	$V_{I(OFF)}$ (V)		Error (%)
	Datasheet	Simulation	
30	1.75	1.7310	-1.08571
50	1.8	1.7743	-1.42778
100	1.85	1.8345	-0.83784
200	1.92	1.8989	-1.09896
500	2.0	1.9936	-0.32000
1000	2.08	2.0813	0.06250
2000	2.18	2.1954	0.70642
3000	2.27	2.2805	0.46256

DC current gain vs. output current

Circuit simulation result

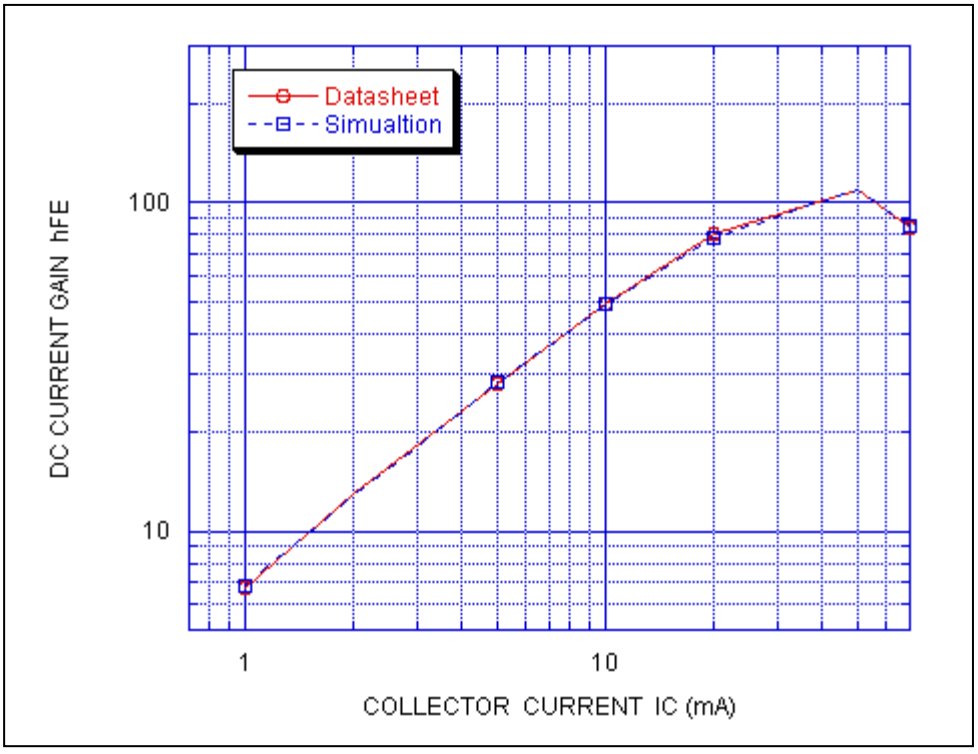


Evaluation circuit



Comparison Graph

Circuit Simulation Result



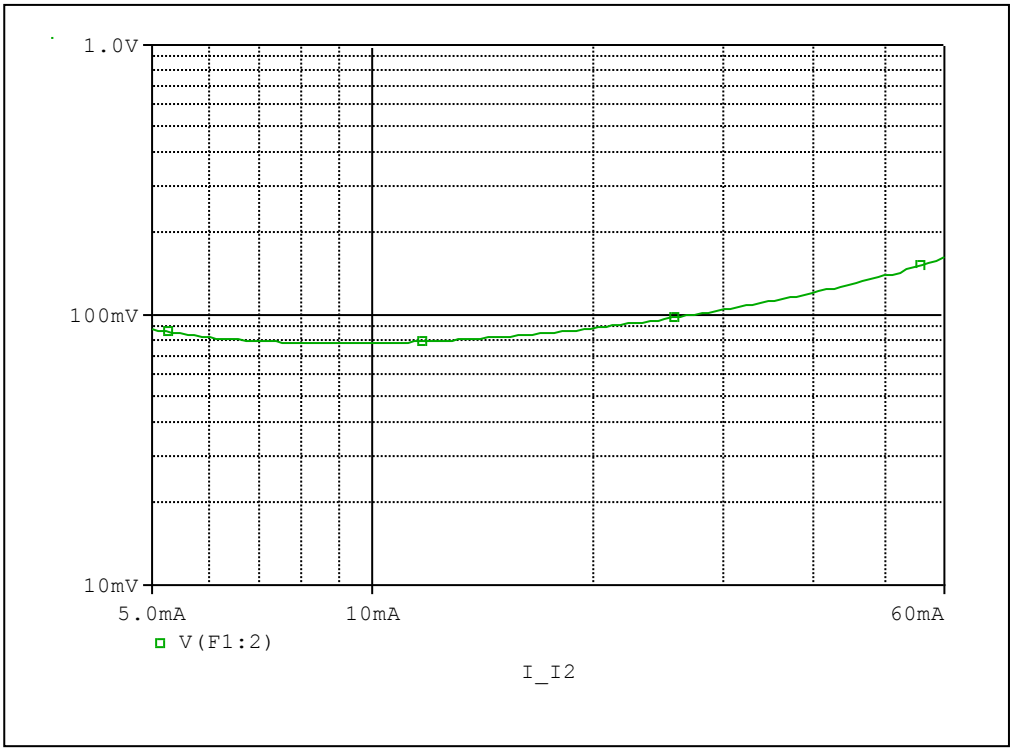
Simulation Result

Condition @ Vce = 5 V

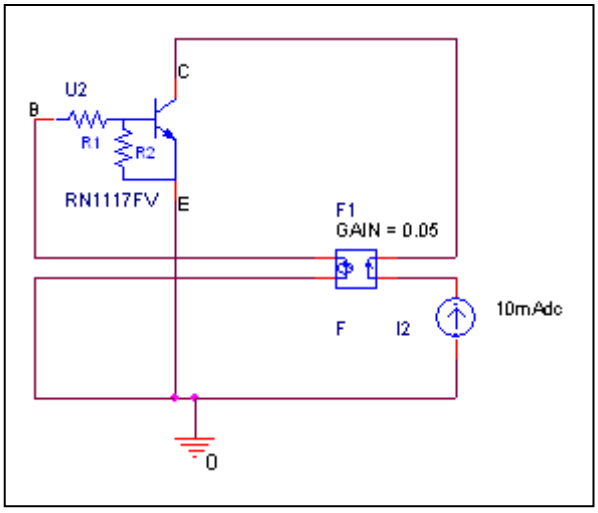
Ic(mA)	hFE		Error (%)
	Datasheet	Simulation	
1	6.7	6.8092	1.62985
2	13	12.816	-1.41538
5	28	28.292	1.04286
10	49	48.965	-0.07143
20	80	77.839	-2.70125
50	110	109.044	-0.86909
70	84	84.926	1.10238

Output voltage VS. output current

Circuit simulation result

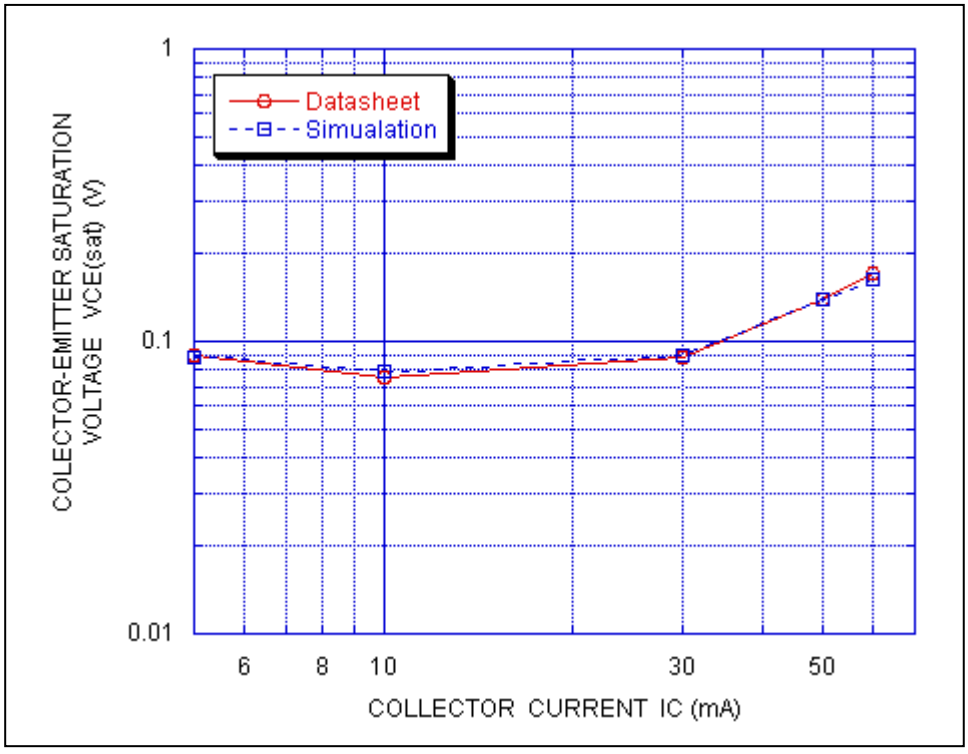


Evaluation circuit



Comparison Graph

Circuit Simulation Result



Simulation Result

Condition @ I_C/I_B = 20

Ic(mA)	V_{CE} (sat) (mV)		Error (%)
	Datasheet	Simulation	
5	0.090	0.088542	-1.62000
10	0.0755	0.078824	4.40265
30	0.088	0.089476	1.67727
50	0.14	0.139978	-0.01571
60	0.17	0.162651	-4.32294